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ABSTRACT

The present paper questions the validity of Macnamara's (1966) finding that teaching arithmetic through a bilingual's weaker language leads to retardation in problem arithmetic. By comparing the performance of immersion pupils on an Irish (as a second language) version of the problem arithmetic test with the performance of non-immersion pupils on an English (as a first language) version, Macnamara's study confounds bilinguals' competence in arithmetic with their ability to demonstrate this competence when tested through their weaker language. Macnamara's attempt to demonstrate the equivalence of Irish and English versions of the problem arithmetic test fails to take account of probable differences in Irish competence between the immersion pupils in the pretest and those in the main study. Macnamara rejects Cummins' criticism in a brief reply. Cummins' reply to Macnamara's reply is also provided. (Author/CFM)

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Immersion Education in Ireland: A Critical Review of Macnamara's Findings

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Abstract

The present paper questions the validity of Macnamara's (1966) finding that teaching arithmetic through a bilingual's weaker language leads to retardation in problem arithmetic. By comparing the performance of immersion pupils on an Irish (L_2) version of the problem arithmetic test with the performance of non-immersion pupils on an English (L1) version, Macnamara's study confounds bilinguals' competence in arithmetic with their ability to demonstrate this competence when tested through their weaker language. Macnamara's attempt to demonstrate the equivalence of Irish and English versions of the problem arithmetic test fails to take account of probable differences in Irish competence between the immersion pupils in the pretest and those in the main study.

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Immersion Education in Ireland: A Critical Review of Macnamara's Findings

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In "Bilingualism and Primary Education" John Macnamara (1966) reported two principle findings regarding the educational effects of the program for the restoration of Irish. Firstly, he found that the teaching of arithmetic through Irish to native English-speakers resulted in lower levels of problem but not mechanical arithmetic. Macnamara argues from this result that the use of a bilingual's weaker language as a medium of instruction involves retardation in the subject matter taught. Macnamara's second finding was that the English attainment of Irish children was very much below that of English children. This second finding is attributed by Macnamara to the different amounts of time spent teaching English in Irish and English schools, a conclusion which seems reasonable, although as Macnamara admits, other factors may also be operating.

Macnamara's study has been influential in promoting a "negative theory of bilingualism" (Stern, 1973), although recent North American bilingual education experiments have not supported his findings. The present paper questions the validity of Macnamara's first finding on the grounds that his study confounds bilinguals' competence in arithmetic with their ability to demonstrate this competence when tested through their weaker language.

The starting point for this criticism comes from comments made by Lambert and Tucker (1972) in their introduction to the St. Lambert bilingual education experiment in Montreal. Discussing Macnamara's findings, they note that children from English-speaking homes who take all their schooling through Irish (Macnamara's group 5, p. 48 ff. and p. 101 ff.) do as well or better in English, Irish and mechanical arithmetic as children taught exclusively in the home language (be it Irish or English). Lambert and Tucker attribute the fact that this group performed at a significantly lower level than the other English-background children on a test of problem arithmetic

> "...to the fact that, because of school requirements, group 5 had an Irish translation of the Problem Arithmetic test rather than the English version given groups 1-4. Since group 5 scored highest in the English

tests, they very likely would have done as well or better on the English version especially because concepts of buying, selling, dividing, etc. would all be more vivid in their home language." (1972, p. 7)

A closer examination of Macnamara's data adds weight to Lambert and Tucker's point. Retardation in arithmetic among group 5 (immersion) children is observed only in problem arithmetic despite the fact that both problem and mechanical arithmetic have been taught through the children's weaker language. The difference between problem and mechanical arithmetic tests lies in the fact that in problem arithmetic the test items are expressed in sentences whereas in mechanical arithmetic items are expressed in arithmetical symbols. Thus, a pupil's grasp of the language of testing is likely to play a much larger role in problem than in mechanical arithmetic.

How is an inadequate grasp of the language of testing likely to affect a child's performance on the problem arithmetic test in which "he is required to read and interpret prose passages"(Macnamara, 1967, p. 122). The answer to this question comes from a series of studies carried out by Macnamara himself (Kellaghan and Macnamara, 1967; Macnamara, 1967). Briefly, the findings of these studies were that

a. "...bilinguals take longer to solve written problems when they are presented in their weak rather than their strong language" (Macnamara, 1967, p. 123).

b. "...the problem-solving ability of bilingual children is poorer when the information is provided in their weaker language, even when the components of the problem are separately understood" (Macnamara, 1967, p. 125).

c. reading of arithmetical problems in Irish took from 1.4 to 1.7 times as long as reading the same problems in English both for native English-speaking children who had been taught all subjects through Irish and for children who had been taught all subjects in English.

Macnamara (1967) concludes that when problems are presented in a bilingual child's weaker language he has "greater difficulty in making out the meaning... Consequently he has greater difficulty in picking out what is relevant to his purpose and discarding the remainder (p. 131)".

Macnamara (1966, p. 137, footnote 2) seems to interpret the results of these experiments as support for his position that children <u>taught</u> through a weaker language are likely to suffer subject-matter retardation as a result. However, the findings equally suggest that children <u>tested</u> in their weaker language will perform less well than if tested in their

stronger language. Thus, Macnamara's (1967) own findings suggest that group 5 children may have been at a definite disadvantage in having to take the problem arithmetic test in their weaker language while children in the other English-background groups took the problem arithmetic test in their stronger language. This probability is increased when one considers that when I.Q., social class and quality of teaching were controlled, Macnamara found "no significant differences in Irish or in English between children who had been taught throughout their six years of primary schooling in Irish and those taught in English"(1967, p. 133). In other words, as far as reading skills were concerned, Irish was just as much a weaker language for group 5 children as it was for the other English background groups.

Macnamara was aware of the dangers involved in giving different versions of the problem arithmetic test to different groups and attempted to show that the Irish and English versions of the test were equivalent in difficulty for group 5 children. The problem arithmetic test was pretested with 96 children in six different schools. Two of the schools were in Co. Donegal and four in Dublin. One of the Donegal schools was in a bilingual area and almost half its pupils were native Irish-speakers. Pupils in the schools were divided at random into numerically equal groups and were tested with either Irish or English versions of the test. Pupils who took the Irish version scored about two points lower than those who took the English version (Irish mean 92.8; English mean 94.8). Macnamara followed up this experiment by retesting the Dublin children in a different language and calculating difference scores between first and second administrations of the test. Children who took the English version after the Irish version gained an average of 8.1 quotient points whereas children who took the Irish version after the English version gained only 1.6 quotient points (figures calculated from Macnamara, 1966, p. 64, boys and girls combined). These figures suggest that the Irish version may have been somewhat more difficult. However, when scores were analyzed separately for boys and girls the differences were non-significant, although for boys the differences approached significance (Table 7.6, p. 65).

The important point in relation to the pretesting of the problem arithmetic test is not that the Irish version proved consistently more difficult than the English version, although Macnamara (1966, p. 79) states that a similar trend for the Irish version of the nonverbal reasoning test caused "some misgiving". The important point is rather that the six immersion schools in which the problem arithmetic test was pretested were not in any way representative of the immersion schools in Macnamara's group 5.

The atypical nature of these schools is immediately obvious when one compares their performance on the problem arithmetic test with the performance of the groups in Macnamara's main study. The problem arithmetic mean for the pretest sample is 94.8 on the English version and 92.8 on the Irish version - almost ten points higher (on the Irish version) than the group 5 mean and 6.5 points higher (on the English version) than any of the other groups in the main study!

An examination of the characteristics of the pretest schools provides additional evidence that these schools are very atypical of the group 5 schools which participated in Macnamara's main study. Four of the six pretest schools were in Dublin whereas all but four of the total of 119 schools in the main study were from rural areas and country towns (p. 74). The exact number of urgan group 5 schools used in the main study is not given, but it can hardly have been more than one. The importance of this lies in the fact that

> "...in rural areas and country towns...few parents had a choice of schools for their children... Thus, it is quite unlikely that the parents of children who attended most Irish medium schools in English-speaking areas differed in their attitudes towards Irish or English from the generality of Irish parents..." (1966, p. 74).

In other words, many of the parents of children in Macnamara's group 5 schools would have held neutral or negative attitudes towards Irish and fewer than 10% would have spoken any Irish at home. However, in urban areas parents do have a wide choice of schools and those who send their children to Irish medium schools tend to be middle class, have very positive attitudes towards Irish and frequently speak Irish at home.[1] Consequently, because of higher SES, greater use of Irish at home and more positive parental attitudes towards Irish, the Dublin children in the pre-testing of the problem arithmetic test are likely to have had a much higher level of Irish competence than the majority of group 5 children in the main study. These differences between pretest and group 5 children are reflected in the marked superiority of the pretest children on the problem arithmetic test.

The point is that even if the Irish and English versions of the problem arithmetic test were equivalent for the pretest sample, the atypical nature of this sample rules out the possibility of generalizing this equivalence to the group 5 children in the main study. In short, the equivalence or

non-equivalence of the Irish and English versions is a function not only of the tests themselves but also of the Irish and English competence of pupils taking the test. Because Macnamara fails to demonstrate that the pretest and group 5 samples had similar levels of Irish competence, and because there is reason to believe that they had not, his attempt to demonstrate the equivalence of the Irish and English versions of the problem arithmetic test is unconvincing.

If the Irish and English versions of the problem arithmetic test were not equivalent for group 5 children then Macnamara's findings may amount to nothing more than that children tested through their weaker language perform more poorly than children tested through their stronger language.

In opposition to this it might be argued that if a child's Irish competence is so low that he is handicapped on an Irish version of the problem arithmetic test, then he is unlikely to optimally benefit from instruction through Irish. It is unfortunate that Macnamara's data do not permit us to test this hypothesis empirically. In respect to the problem arithmetic data, the effects of receiving instruction through a weaker language are totally confounded with the effects of performing a test in a weaker language. Thus, no inferences regarding the effects of receiving instruction through a weaker language can be drawn from Macnamara's study.

However, the fact that the Irish reading competence of group 5 children was no higher than that of non-immersion pupils suggests that one of the objectives of the immersion schools was not being attained. This is not surprising given the fact that parental support for the immersion program was probably, at best, lukewarm. Thus, it is quite possible that some children in these schools who remained very much more dominant in English may not have benefited optimally from instruction through Irish. This possibility suggests the potential fruitfulness of regarding the L2 competence attained by pupils in immersion programs as an intervening variable in evaluating the academic and cognitive effects of the program (see Cummins, 1976, 1977).

Footnote

1. A survey of teachers in all-Irish schools (carried out by the writer in 1976) showed that over 60% of pupils in Dublin immersion schools spoke Irish at least some of the time at home.

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REPLY TO DR. CUMMINS

JOHN MACNAMARA

McGill University

Dr. Cummins argues that I misinterpreted the findings of my own study (Macnamara 1966) relating to arithmetical problems. The children in question were native speakers of English who had been taught all subjects, including arithmetic, through the medium of Irish. Their problem arithmetic test was in Irish. Cummins believes that they would have scored significantly better if they had been tested with the English version of the test. This despite the fact that in pretest comparisons of the Irish and English versions there was no evidence to this effect; and he has none either. He claims that the schools used in the pretests were unsuitable because the children there were especially good at Irish, their second language.

This is meant to buttress the case that the run of Irish children who speak only English at home and in the environment would fare as well if taught problem arithmetic in Irish as if they were taught in English. His case rests on the fact that they are weak in Irish. He even underlines their weakness by citing other studies carried out by Dr. Tom Kellaghan and myself which showed that Irish-taught English speakers (a) read Irish more slowly than English, (b) that they have greater difficulty coping with information presented in Irish, (c) they are less successful in solving problems presented in Irish.

There simply is no dealing with such stalwart logic. However his final paragraph has the redeeming merit of seeming to retract his whole case.

(20/1/77)

Reply to the Reply

James Cummins
The University of Alberta

Significantly, Dr. Macnamara's reply ignores the issues I raised in relation to the design of his study. Briefly, the criticism was that the pretest equivalance of the Irish and English versions of the problem arithmetic (PA) test cannot be generalized to the immersion group in the main study because of patent differences between the pretest sample and the sample in the main study. Consequently, the effects of testing through a weaker language are totally confounded with the effects of instruction in a weaker language.

Does Macnamara dispute the validity of this criticism or does he acknowledge its validity? I don't know. Although he does mention the claim that the schools used in the pretest were "unsuitable" he does not pursue the issue. In the absence of any attempt to refute this "claim" one must presume that Macnamara acknowledges its validity.

What about my alleged "case" to which Macnamara devotes his energies? Macnamara's interpretation of my "case" misses the point completely. Nowhere in the paper did I argue that the immersion group would necessarily have performed better on an English version of the PA test. Such an argument would clearly be inadmissible since the effects of testing through a weaker language are confounded with the effects of instruction in a weaker language. In other words, the lower PA scores of the immersion group could be due to either or both of these phenomena, but can be attributed unequivocably to neither.

Macnamara's study claims to show that the lower PA scores of the immersion group are attributable solely to instruction in a weaker language. My claim is not that these scores are attributable solely to the effects of testing in a weaker language but that the flaws in Macnamara's research design do not allow him to rule out this possibility.

On several occasions Macnamara has rightly warned about the dangers of generalizing research findings from one immersion context to another. His study of immersion education in Ireland illustrates these dangers.